

V. REMARKS

Claims 6-8 in 14-16 are rejected under 35 U.S.C. 102(a) as anticipated by Jurgensen (U.S. Patent No. 6,888,853). The rejection is respectfully traversed.

Jurgensen teaches an improved laser radiation source for processing materials as well as an arrangement for processing materials having a laser radiation source and the operation. An extremely high power density and energy are achieved in a cost-beneficial way and both the beam shape with respect to flexibility, precision and beam positioning as well as the beam power can be exactly controlled even given significantly higher laser powers. A system and method are provided for selectively processing material on a processing surface of a printing form to create a fine structure or pattern for images or text. At least one fiber laser includes a pump source and a laser fiber. A laser gun is mounted adjacent the printing form and has at least a focusing optics. The fiber laser outputs a laser beam which is diffraction-limited to permit the focusing optics to focus the laser beam onto the processing surface of the printing form as a spot having a spot size sufficiently small to process the processing surface to create the fine structure or pattern for images or text.

Claim 6, as amended, is directed to an apparatus for cutting brittle material by irradiating a brittle material with a laser light from a laser light source and moving that irradiating position along a predetermined line of the brittle material that includes a plurality of laser light sources, a plurality of optical fibers, a light intensity measuring means and a scanning means. Claim 6 recites that the plurality of optical fibers is bundled so as to guide the laser light from each laser light source to a surface of the brittle material and arranged such that irradiating spots of the laser lights irradiating the brittle material are arranged in a matrix arrangement. Claim 6 further recites that the light intensity measuring means measures a light intensity distribution of the composite laser light on an irradiated surface of the brittle material. Claim 6 also recites that the scanning means moves a position at which the laser light is irradiated onto the brittle material. Additionally, claim 6 recites that the composite laser light which has a predetermined shape is irradiated onto the surface of the brittle material with the

plurality of bundled optical fibers, and the light intensity distribution of this composite laser light is adjusted by controlling respectively the light intensity of the plurality of laser light sources in response to the measured light intensity distribution of the composite laser light.

It is respectfully submitted that the rejection is improper because the applied art fails to teach each element of claim 6 as amended. Specifically, it is respectfully submitted that the applied art fails to teach light intensity measuring means that measures a light intensity distribution of the composite laser light on an irradiated surface of the brittle material. Further, it follows that the applied art also fails to teach that the light intensity distribution of this composite laser light is adjusted by controlling respectively the light intensity of the plurality of laser light sources in response to the measured light intensity distribution of the composite laser light. As a result, it is respectfully submitted that claim 6 is allowable over the applied art.

Claim 14, as amended, is directed to an apparatus for cleaving brittle material by irradiating the brittle material with a laser light from a laser light source and moving that irradiating position along a predetermined line of the brittle material and includes a plurality of laser light sources, a plurality of optical fibers, a light intensity measuring means and a scanning means. Claim 14 recites that the plurality of optical fibers are bundled so as to guide the laser light from each laser light source to a surface of the brittle material, and arranged such that irradiating spots of the laser lights irradiating the brittle material are arranged in a matrix arrangement. Claim 14 further recites that the light intensity measuring means measures a light intensity distribution of the composite laser light on an irradiated surface of the brittle material and the scanning means moves a position at which the laser light is irradiated onto the brittle material. Furthermore, claim 14 recites that the composite laser light which has a predetermined shape is irradiated onto the surface of the brittle material with the plurality of bundled optical fibers, and the light intensity distribution of this composite laser light is adjusted by controlling respectively the light intensity of the plurality of laser light sources in response to the measured light intensity

distribution of the composite laser light.

It is respectfully submitted that the rejection is improper because the applied art fails to teach each element of claim 14 as amended. Specifically, it is respectfully submitted that the applied art fails to teach light intensity measuring means that measures a light intensity distribution of the composite laser light on an irradiated surface of the brittle material. It follows that the applied art also fails to teach that the light intensity distribution of this composite laser light is adjusted by controlling respectively the light intensity of the plurality of laser light sources in response to the measured light intensity distribution of the composite laser light. As a result, it is respectfully submitted that claim 14 is allowable over the applied art.

Claims 7 and 15 are canceled and therefore the rejection as applied thereto is now moot.

Claim 8 depends from claim 6 and includes all of the features of claim 6. Claim 16 depends from claim 14 and includes all of the features of claim 14. Thus, it is respectfully submitted that the dependent claims are allowable at least for the reason the independent claims are allowable as well as for the features they recite.

Withdrawal of the rejection is respectfully requested.

Claims 7, 8, 15 and 16 are rejected under 35 U.S.C. 103(a) as unpatentable over Jurgensen as applied to claims 6 and 14 and further in view of Das et al. (U.S. Patent Application Publication No. 20030074096). The rejection is respectfully traversed.

Das discloses a selective laser sintering method for producing a heterogenous product in which a model of the heterogenous product is generated using a computer. The model is processed using an electronic processing device to obtain a plurality of cross-sectional layer representations of the model. The method includes the steps of positioning an array of delivery nozzles adjacent to a material deposition bed; filling each of the nozzles with at least one of a plurality of different materials with the materials differing in at least one of composition and deposition properties; and directing the nozzles to

various positions relative to the deposition bed and disposing the materials upon the deposition bed at the various positions to form each of the plurality of cross-sectional layer representations of the model.

It is respectfully submitted that, as discussed above, claims 6 and 14 are allowable over Jurgensen. Das fails to cure the deficiencies of Jurgensen. As a result, it is respectfully submitted that claims 6 and 14 are allowable over the combination of these references.

As mentioned above, claims 7 and 15 are canceled.

Claim 8 depends from claim 6 and includes all of the features of claim 6.

Claim 16 depends from claim 14 and includes all of the features of claim 14. Thus, it is respectfully submitted that the dependent claims are allowable at least for the reason the independent claims are allowable as well as for the features they recite.

Withdrawal of the rejection is respectfully requested.

Claims 1-16 are rejected under 35 U.S.C. 103(a) as unpatentable over Japan 407328781 and Japan 410034364 and Japan 2002035979 in view of either Japan 2001228449 or Jurgensen. The rejection is respectfully traversed.

Japan 407328781 teaches a splitting method of brittle material. A generation of an initial crack is executed while simultaneously irradiated two positions near the edge of a workpiece with a laser beam while plural irradiated positions are controlled to a prescribed positional relationship or a laser output of irradiated positions is controlled. The laser beam travels along a line to induce the crack. Heat stress distribution is distributed between the laser beam irradiated positions.

Japan 410034364 teaches a brittle material splitting method by plural point sources. A crack formed in a starting point of a material is guided with thermal stress by irradiation generated by a laser beam along a predetermined split line. Plural heat sources have respectively different diameters from each other which are simultaneously applied to a position being a forward end of the crack on the predetermined split line. The temperature distribution has aced the grade in the vicinity of the crack and Annie is alarmed without raising the power

density of the laser beam.

Japan 2002035979 teaches a laser beam device for providing a laser beam suitable for laser beam processes. The laser beam device realizes a high degree of freedom in machining and high-speed operations. Plural laser beams are used that have different laser beam characteristics.

Japan 2001228449 teaches a laser beam condensing unit and a laser beam machining device. A laser beam is emitted from a plurality of light sources and is condensed so as to have a high energy density at a small spot.

Claim 1, as amended, is directed to a method for cutting brittle material by irradiating laser light from a laser light source onto a brittle material to generate thermal distortions over a wide range of the brittle material, providing cracks in the interior of the brittle material and moving that irradiating position along a predetermined line of the brittle material to cut the brittle material. Claim 1 recites the steps of:

providing a plurality of optical fibers which guide laser lights from a plurality of laser light sources to the brittle material;

driving the plurality of laser light sources, with the plurality of optical fibers in a bundled condition such that irradiating spots of the lights irradiating the brittle material are arranged in a matrix arrangement, for irradiating a composite laser light which achieves a predetermined shape onto a surface of the brittle material being irradiated;

measuring a light intensity distribution of the composite laser light on the irradiated surface of the brittle material; and

in response to measuring the light intensity distribution, adjusting the light intensity distribution of this composite laser light by controlling respectively the light intensity of the plurality of the laser light sources.

It is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests the features of claim 1 as amended. Specifically, it is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests the step of measuring a light intensity distribution of the composite laser light on the irradiated surface of the brittle

material. Further, it follows that none of the applied art, alone or in combination, teaches a step of adjusting the light intensity distribution of the composite laser light in response to measuring the light intensity distribution. Thus, it is respectfully submitted that one of ordinary skill in the art would not be motivated to combine the features of the applied art because such combination would not result in the claimed invention. As a result, it is respectfully submitted that claim 1 is allowable over the applied art.

It is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests the features of claim 6 as amended. Specifically, it is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests light intensity measuring means that measures a light intensity distribution of the composite laser light on an irradiated surface of the brittle material. Further, it follows that the applied art also fails to teach or suggest that the light intensity distribution of this composite laser light is adjusted by controlling respectively the light intensity of the plurality of laser light sources in response to the measured light intensity distribution of the composite laser light. Thus, it is respectfully submitted that one of ordinary skill in the art would not be motivated to combine the features of the applied art because such combination would not result in the claimed invention. As a result, it is respectfully submitted that claim 6 is allowable over the applied art.

Claim 9, as amended, is directed to a method for cleaving brittle material wherein thermal distortions are generated over a wide range of the brittle material by irradiating laser light from a laser light source onto a brittle material, and a crack formed at a starting point of processing the brittle material is advanced by moving that irradiating position along a predetermined line of the brittle material to cleave the brittle material. The method includes the steps of:

providing a plurality of optical fibers which guide laser lights from a plurality of laser light sources to the brittle material;

driving the plurality of laser light sources, with the plurality of optical fibers in a bundled condition such that irradiating spots of the laser lights irradiating a surface of the brittle material are arranged in a matrix arrangement, for irradiating

a composite laser light which achieves a predetermined shape onto the surface of the brittle material;

measuring a light intensity distribution of the composite laser light on the irradiated surface of the brittle material; and

in response to measuring the light intensity distribution, adjusting the light intensity distribution of this composite laser light by controlling respectively the light intensity of the plurality of the laser light sources.

It is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests the features of claim 9 as amended.

Specifically, it is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests measuring a light intensity distribution of the composite laser light on the irradiated surface of the brittle material. It follows that none of the applied art, alone or in combination, teaches or suggests adjusting the light intensity distribution of the calm deposit laser light in response to measuring the light intensity distribution. Thus, it is respectfully submitted that one of ordinary skill in the art would not be motivated to combine the features of the applied art because such combination would not result in the claimed invention. As a result, it is respectfully submitted that claim 9 is allowable over the applied art.

It is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests the features of claim 14 as amended.

Specifically, it is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests Specifically, it is respectfully submitted that the applied art fails to teach or suggest light intensity measuring means that measures a light intensity distribution of the composite laser light on an irradiated surface of the brittle material. It follows that the applied art also fails to teach or suggest that the light intensity distribution of this composite laser light is adjusted by controlling respectively the light intensity of the plurality of laser light sources in response to the measured light intensity distribution of the composite laser light. Thus, it is respectfully submitted that one of ordinary skill in the art would not be motivated to combine the features of the applied art because such

combination would not result in the claimed invention. As a result, it is respectfully submitted that claim 14 is allowable over the applied art.

As mentioned above, claims 7 and 15 are canceled.

Claims 2-5 depend from claim 1 and include all of the features of claim 1. Claim 8 depends from claim 6 and includes all of the features of claim 6. Claims 10-13 depend from claim 9 and include all of the features of claim 9. Claim 16 depends from claim 14 and includes all of the features of claim 14. Thus, it is respectfully submitted that the dependent claims are allowable at least for the reason the independent claims all are allowable as well as for the features they recite.

For instance, claims 8 and 16 recite that a transportation means for transporting the light intensity measuring means along the laser light irradiated surface of the brittle material.

Withdrawal of the rejection is respectfully requested.

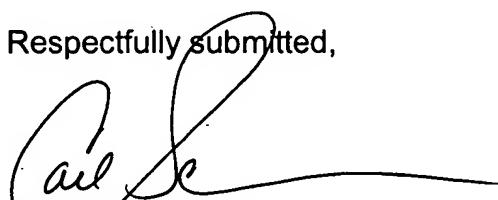
Newly-added claims 17-20 also include features not shown in the applied art.

In view of the foregoing, reconsideration of the application and allowance of the pending claims are respectfully requested. Should the Examiner believe anything further is desirable in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' representative at the telephone number listed below.

Should additional fees be necessary in connection with the filing of this paper or if a Petition for Extension of Time is required for timely acceptance of the same, the Commissioner is hereby authorized to charge Deposit Account No. 18-0013 for any such fees and Applicant(s) hereby petition for such extension of time.

Respectfully submitted,

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